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DIGITAL AGENDA

BROADBAND

Breaking the digital gridlock

July 26, 2004, 4:00 AM PT

High-speed Internet access is rapidly evolving from a Web-surfing luxury into an everyday necessity. But the development of broadband technology remains stunted by market uncertainty and mind-numbing bureaucracy.

This is the second of a special News.com series that will attempt to set a realistic agenda on important issues involving technology, its business and relevant policies.

This special series identifies the crucial elements of any policy agenda aimed at building a national broadband network. In its examination of the issue's many complexities, the report includes a CNET News.com-Harris Interactive Poll of about 1,000 Internet users nationwide.

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A life-saving technology
From public safety to health care, broadband is becoming a key tool.

Day 2
Why policies must change
Drastically different rules are needed for true competition.

Day 3
South Korea leads way
Washington can learn some valuable lessons from Seoul.

Day 4
Cable, DSL face threats
Wireless and other networks pose new challenges to the duopoly.

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A life-saving technology

By John Borland and Jim Hu
Staff Writers, CNET News.com
July 26, 2004, 4:00 AM PT

In a small military hospital in Guam, a cardiac patient lay unconscious as a catheter was slid carefully into the right chamber of his heart.

CASE STUDY: SAFETY NET

NexGen City's wireless broadband system was installed in June by the police department in Garland, Texas. *Source: NexGen City*

Washington, D.C.

"First responder" wireless project has:

- Completion date of late summer 2004.
- Ten transceiver sites to cover entire city.
- Download speeds of at least 1.5mpbs.
- Estimated cost of $2.7 million for first year.
- Applications such as remote detection of chemical and biological agents, video surveillance, video support for helicopters and bomb squads, doctor support for ambulances.

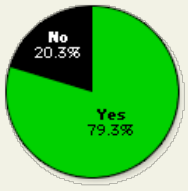
Emergency test

Washington, D.C., is testing a new wireless broadband network that would provide mobile high-speed data, video and audio feeds to police, firefighters and emergency crews. The one-year trial project was started with an experimental license from the FCC and with equipment from Motorola and Flarion Technologies.

Public safety officials say this is the future, but they need another big chunk of the airwaves--now destined for auction to the private sector--in order to make this type of system work efficiently. A group made up of local public safety officials is lobbying Congress to make this happen.

Chipping in funds

In a recent survey, most people said they would pay $1 in Internet access fees to fund a broadband network for police, fire and emergency crews.



Source: CNET News.com-Harris Interactive poll of U.S. Internet users.

The surgery was fairly routine, save for one notable absence: The physician in charge wasn't in the operating room during the procedure. In fact, he wasn't even on the island.

Dr. Benjamin Berg supervised the entire surgery while in front of a computer screen 3,500 miles away at Tripler Army Medical Center in Honolulu. He dictated the procedure to the less-experienced colleague who performed the operation, monitoring every move with a high-resolution video camera while getting instant sensor data from the catheter itself.

"The real-time information requires a continuous broadband connection," Berg said. "The delay in the transmission of data about pressure inside the heart would be unacceptable."

The delicate process illustrates why high-speed Internet access--once considered a luxury--is viewed increasingly as a necessity. Broadband is being used in projects that could revolutionize such critical areas as education, health care and public safety while creating enormous opportunities in business and entertainment.

Realizing that potential, however, has been a perennially elusive goal. To date, Internet development has been marked by extremes: Although the nation has a glut of "backbone" bandwidth that can move data from coast to coast in an instant, these high-speed networks slow to a relative crawl at the infamous juncture known within the industry as "the last mile"--the local connections that link ordinary homes and businesses to the Internet.

The transportation metaphor is apt, as policymakers are recognizing that fast Internet connections are as essential to the future of the economy now as railroads and highways were in the last two centuries. Those systems transformed the way people lived and worked, irrevocably changing human conceptions of distance, speed and time. Even in its relative

infancy, broadband is already having much the same effect.

So important is the technology that it has been elevated to a national campaign issue this election year. President Bush and Democratic challenger John Kerry have each outlined plans to increase investment in the technology as part of their platform agendas, and policymakers of all stripes cite it as an important driver of future economic growth.

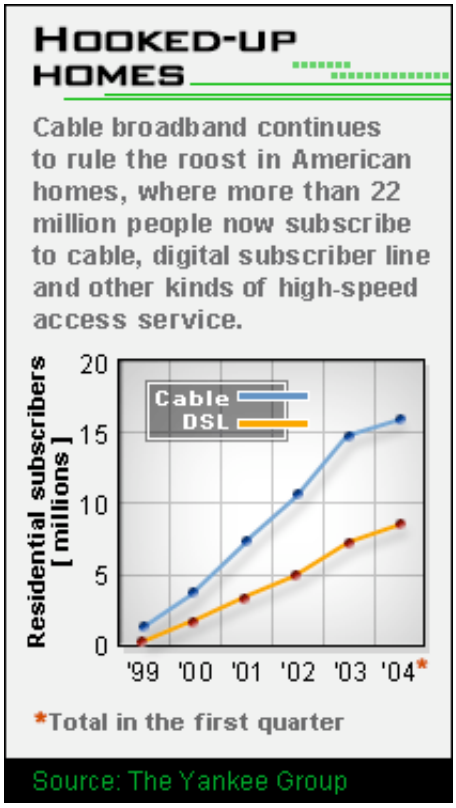
"If the United States is going to maintain its ability to grow its economy, I think the continued proliferation of broadband technologies is key to that solution," Federal Communications Commission Chairman Michael Powell said in a speech in May. "This is the central communication policy objective of the era. It's more than talk now. It is time for action."

Critical uses for broadband technology are multiplying every day in a wide range of fields:

• **Public safety**. Emergency services--including firefighters, police forces and medical crews--see wireless broadband as a vital addition to their tools, and are lobbying Congress to help improve these capabilities. Municipalities from Milpitas, Calif., to Washington, D.C., are experimenting with technologies that can speed emergency response times and help provide environmental data such as hazardous chemical readings.

• **Health care**. "Telemedicine" has long been one of the most promising applications for high-speed networks. Rural and outlying hospitals and clinics rarely have access to the expertise and experience of doctors in urban centers. But diagnoses and consulting can be done with the help of high-quality audio and video and of real-time data connections between central and remote facilities.

• **Education**. Schools at all levels are already using high-speed Internet connections in teaching and research, and many see the networks as ways to help smooth out the radically unequal distribution of resources between different regions and institutions. Colleges provide access to course materials online, via streaming videos of lectures, for instance. High schools use the Internet for research purposes and help students create their own multimedia Web sites.



A matter of economics

Despite the recognition of broadband as an important issue across the political spectrum, not everyone agrees that it merits federal involvement. Skeptics and fiscal conservatives say the government should not provide funding or tax breaks to develop broadband networks, arguing that such financial incentives are unfair and could disrupt natural competition in the marketplace.

To be sure, much of the push for faster networks comes from high-tech companies that stand to benefit directly from equipment sales. These businesses have lobbied heavily and consistently for greater national investment, particularly since venture capital for telecommunications dried up with the dot-com bust.

At the top of the scale are giants like Cisco Systems and Nortel Networks, which provide the routers and other technologies that send data across networks. Smaller companies would also benefit, such as OneEighty Networks, which last month helped create a 100-block-wide public Wi-Fi hot spot in its hometown of Spokane, Wash., or Tropos Networks of Sunnyvale, Calif., whose equipment helped Garland create a public safety network based on Wi-Fi.

But economists say the positive effects of broadband will be felt far beyond the networking industry and could add between $300 billion and $500 billion a year to the U.S. economy. One widely cited study, led by a Brookings Institution researcher, predicts that ubiquitous broadband access could create 1.2 million jobs in the United States.

THE TROUBLE WITH FIBER

Optics projects are the future, but difficulties in building networks will mean slow going.

Fiber-optic broadband makes DSL look as outdated as two cans and string, with its potential to give homes connections as fast as 100mbps or more.

SBC and Verizon have said they're finally beginning to

companies as Visicu, which provides the equipment that Berg's hospital in Hawaii uses to monitor intensive care unit operations in Guam. Within information technology alone, expanding businesses would range from small companies like Illinois-based CyberTech Media, which digitizes video for presentations inside corporate networks, to industry stalwarts like Intel, which sees broadband wireless components as a new market.

Many economists view broadband as a vital part of the next technology wave that they believe will drive growth and improve productivity. Although no one is predicting anything on the scale of the 1990s high-tech gold rush, broadband could make real many theoretical uses of the Internet touted in the early days of its development as a mainstream medium.

Such prospects have prompted rural development agencies into making plaintive calls for broadband investments, to avoid being left out of another digital economic boom.

"We see broadband as a key, key component for economic development in this region," said Marc DeFalco, who heads the telecommunications program for the Appalachian Regional Commission, a 13-state economic development agency. "We look on broadband as a means of opening up rural areas to the same opportunities that people would have in urban areas."

That's already happened for Bobby Tuck, who heads Tuck Mapping Solutions in Big Stone Gap, a small Appalachian town in Virginia's Eastern tip. Tuck, whose company specializes in aerial mapping, used to swap floppy-disk files with his clients when he started his business years ago. But as technology progressed, the files got larger. He soon found himself loading hard disks into his car and driving to clients' offices--sometimes meeting them halfway, if he was lucky.

The files eventually got so big--some reach 150GB--that Tuck was on the verge of relocating, despite having been in the area for 20 years. Then last year, a regional planning commission won funding to bring a fiber connection to the area, and Tuck's business turned around.

With access to a 100-megabit-per-second connection, the company could suddenly download critical data files in two or three minutes, where it had taken 8 hours before. The business is now staying put, and others in the area have found new opportunities.

"What it's done for us is make us a major player in our field," Tuck said. "We could work almost anywhere, once we have access to data. It doesn't make a whole lot of difference where we're located."

make serious investments in bringing the technology to homes. Verizon said last week it would offer speeds of up to 30mbps, beginning in Keller, Texas. But unless you're moving into a newly built suburban neighborhood, don't throw away that old cable modem yet.

Here are a few of the sticking points that keep fiber from being an overnight success story.

Winning rights of way

A company first has to figure out the easiest and cheapest place to put fiber networks, often running lines under city streets or through private land in order to connect homes with central switching facilities. In some cases this will involve getting permission or rights of way.

President Bush has created a working group to help companies work with federal agencies to streamline this process when federal land is involved.

Digging up streets

The biggest problem is getting fiber in the ground. In new neighborhoods, developers can dig trenches and put fiber in before the streets are laid. In urban areas, digging up pavement is difficult and expensive, making fiber to every home an unlikely proposition in the near future.

In some cities, conduits already exist underground. Fiber can be pulled though these tunnels without new trenches having to be dug, as was the case with SBC's Mission Bay development in San Francisco.

Lighting the fiber

Optical fiber is just expensive strings of glass unless electronics that can send and interpret data are put at each end.

Most fiber-to-the-premises projects use a technology called "passive optical networking," which allows download speeds of 622mbps and uploads of 155 mbps. The technology lets that bandwidth be split, so a single fiber could be shared by several homes, for example.

Fiber cuts

The bane of fiber networks is the backhoe. Construction projects are notorious for accidentally cutting through fiber-optic cable while digging underground, throwing networks into temporary chaos or total darkness. Telephone companies have considerable experience in fixing these outages quickly, however.

From the ER to the ABCs

Broadband's benefits are being felt in countless other fields, especially those that rely on real-time access to detailed and complex information. In some cases, it can deeply affect the way children learn or even mean the difference between life and death.

To emphasize the technology's urgency, proponents cite a broadband project being built on the frontlines of homeland security for firefighters, police officers, ambulance crews and other emergency workers in the U.S. capital. The wireless network will enable doctors in Washington-area hospitals to conduct preliminary examinations of patients in ambulances via live video streams. Police officers engaged in high-speed chases will get real-time footage from helicopters, while bomb squads will be able to inspect dangerous sites remotely.

"These are applications that already exist and could greatly enhance the capability of our first responders," said Robert LeGrande, deputy technology officer for Washington, D.C., who is lobbying Congress to set aside more wireless spectrum for public safety.

The multimillion-dollar system, still under construction, is being held up as the future of public safety by lobbyists seeking funds and more wireless spectrum for similar projects. While that process continues, communities as far-flung as Garland, Texas, and Milpitas, Calif., have already created Wi-Fi broadband services on a smaller scale for their own public safety forces.

Broadband proliferation is the central communication policy objective of the era. It's more than talk now. It is time for action.

--Michael Powell
chairman, Federal Communications Commission

Other technology pioneers have long since seen tangible benefits.

Dr. Bruce Dunn of Clement J. Zablocki Veterans Administration hospital in Milwaukee was one of the first doctors in the country to create a "telepathology" practice serving a hospital 200 miles away. Through a broadband connection, his computer receives video images from a remote-controlled microscope in a sister hospital in Iron Mountain, Wisc., which he uses to diagnose cancers and other diseases in tissue samples.

Many more doctors exchange large data files such as X-ray results, which do not require real-time connections but still need high-speed networks. Hospitals have found broadband technologies to be invaluable in non-life-threatening situations as well, saving considerable labor and other resources by using it to handle medical claims, insurance processing and other administrative tasks.

The idea of health care via broadband has even extended to the home. Federally funded studies have found "dramatic" improvements for patients who could communicate with doctors through frequent videoconferences and other technologies. A Florida project serving children with diabetes recently found that patients using the videoconferencing system spent about a fifth of the time in hospital as before, saving tens of thousand of dollars.

Just east of Los Angeles, a project at El Monte Union High School shows benefits of broadband that do not involve emergency services but have had other dramatic effects.

El Monte's administrators recently got a grant from the Beaumont Foundation of America to set up wireless broadband towers on campus, providing Internet access on school grounds. But a related part of the project has secured laptop computers for children living in a nearby trailer park, and the school is now providing them with broadband access to do research and other homework.

"Schools in the low end or in the high end socioeconomically need to look the same," said Nick Salerno, an assistant superintendent with the El Monte Union High School District. "We must provide the same opportunity for everyone."

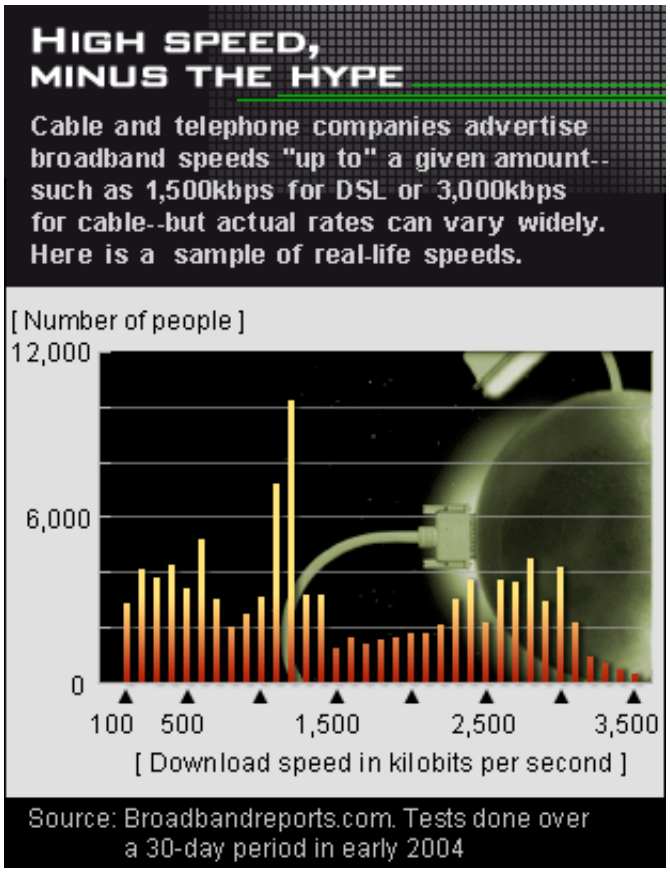
Many other broadband educational applications are transforming teaching and research. University courses are routinely recorded and put online for students who miss class or for those who cannot afford to attend full time. Boys and Girls Club of America chapters are getting live underwater video feeds from a project exploring shipwrecks on the floor of the Black Sea and the Mediterranean Sea.

A new world of entertainment

On the campus of the University of Southern California, students and researchers are being exposed to broadband uses of another kind.

In a darkened lab, a high-definition video of a space shuttle launch fills a viewing screen. Its sounds shake the floor, rumbling from 10 speakers around the room, each with its own audio stream.

This IMAX-like experience shows the potential for broadband networks in ordinary homes--in movies on demand, virtual reality games and even teleconferencing, said Isaac Maya, the director of Industry and Technology Transfer Programs at USC. The shuttle video and all 10 channels of audio--four more than on most DVDs--are streamed in real time from services in Georgia over a superfast Internet2 network.



"The vision is immersive presence," Maya said. "How do you get people in separate locations to feel each others' environments? It's not just video, it's not just audio, it's not just the Internet. You have to do them all."

This potential is part of what excites visionaries in entertainment and consumer markets. If high-speed Internet access becomes ubiquitous, entrepreneurs and media experts have said, the experience of home entertainment, sports, games, communication and anything else connected to the Internet will change radically.

"That's a really big economic driver coming down the line," Gary Bachula, vice president of the Internet2 project, said. "But it's a chicken-and-egg problem. You've got to get the technology deployed before these applications become reality."

Industry veterans say national broadband access will only lead to major changes in U.S. society if connection speeds get exponentially faster than those typical of cable and DSL today. Otherwise, the most likely result will simply be better use of existing technologies, such as those for e-mail, Web surfing and music downloading.

"We need 100mbps or more to the home before we see an impact," Mark Cuban, the former Yahoo executive who now owns the Dallas Mavericks and who runs high-definition cable channel HDNet, wrote in an e-mail. "The cultural change certainly won't come from HDTV, but it will come from high-resolution applications into the home."

That type of connection looks less like science fiction with each day. At the recent Fast Net Futures industry show in Santa Clara, Calif., a pair of companies called Ikonos and Metalink demonstrated 100mbps downloads over a 1,000-foot telephone wire. Telecommunications carriers, meanwhile, say it has become nearly as cheap to wire a brand-new neighborhood with high-speed fiber optic cables as it is to install slower copper wires for DSL.

Still, that vision remains far from reality in the United States, at least until companies start seeing economic motivation--or consumers start demanding--superfast broadband connections. Just ask the high-tech thinkers inside the adult entertainment industry, who are often the first to see profit potential and to act on any impending technology.

"We haven't put forth any efforts that require money," said Wicked Pictures Director of New Media Anne Petrie. Her company offers products for today's broadband subscribers, but has yet to address next generation services, she said. "At this point, we're basically circling the airport, waiting for the connectivity issues to be resolved." ■

Why policies must change

By John Borland
Staff Writer, CNET News.com
July 27, 2004, 4:00AM PT

SAN JOSE, Calif.--Presidential candidate John Kerry stepped to the podium at San Jose State University here last month and declared that broadband was as important to the future of the economy as electricity.

CASE STUDY: UTOPIA

Salt Lake City is one of the municipalities that decided not to fund construction of Utopia's fiber-optic network. *Eric Schramm/Salt Lake City Convention & Visitors Bureau*

Utopia's business plan

- Cities sell low-interest bonds to fund the fiber network build-out.
- The government builds the network, but only private companies can resell access to consumers.
- Revenue is generated when ISPs pay the government a fee to access local customers.
- Revenue pays off municipal bonds and operation costs.

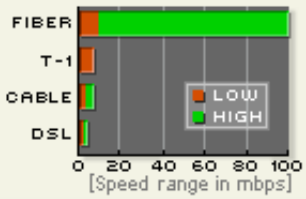
Source: Utopia white paper, November 2003.

Fiber-optic vision

The most ambitious public broadband project in the United States can be found in the mountains of Utah. A project is underway to connect 18 cities with fiber-optic lines that can deliver hundreds of TV channels and speedy broadband. However, the project--dubbed the Utah Telecommunication Open Infrastructure Agency, or Utopia--is in peril. Salt Lake City has backed out of the program, and many other cities are on the fence about ponying up funds. Utopia hasn't abandoned its build-out projects, but it now seems like an incomplete puzzle.

How fast is fiber?

Typical broadband technologies can't handle as much data as can fiber-optic links.



Source: Utopia white paper, November 2003

At almost the same moment, on the other side of the country, President Bush was outlining his own plan for providing universal access to high-speed Internet connections by 2007.

"We need to drive to connect every corner of our country to a network that's up to 100 times faster than everyone else's today," Kerry told an audience of Democratic stalwarts in a speech laden with populist themes. Bush struck a patriotic tone as well, in an address at the Commerce Department in Washington: "The goal is to be ranked first when it comes to per-capita use of broadband technology."

In a month dominated by news ranging from the Iraqi handover to rising interest rates, their remarks underscored the growing importance of broadband Internet policy this election year. Aside from some practical differences, such as Kerry's more activist approach, the positions taken by the two men were notable for their similarities.

Yet turning rhetoric into action will be equally difficult for whichever candidate wins the White House in November. Federal communications policy is a highly politicized and impossibly complicated mess, with regional phone companies and cable networks locked in mortal combat. Landmark telecommunications regulations, passed in 1996, when broadband was largely theoretical, are likely to be reopened in Congress next year--ensuring a new round of Washington infighting and multimillion-dollar lobbying efforts.

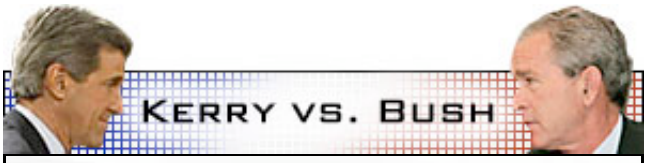
"When you look at the trends, it's not chaos yet--but, if everything continues, it will be chaos in a couple years," said Blair Levin, a Legg Mason analyst and former high-ranking official at the Federal Communications Commission. "I don't think the trains will collide. But sometimes it takes the trains being within earshot of each other before people do anything."

The urgency behind these competing forces has risen from the historic convergence of voice, video,

music and other data into bits and bytes that can flow equally well over any network. Advances in digital technologies have created a massive common battlefield for multiple industries where telephone companies, cable operators, broadcast TV networks and even radio stations are targeting one another's businesses.

As a result, experts increasingly say United States needs a more cohesive national broadband policy. High-speed Internet connections will be a pivotal factor in determining the outcome of this rapid evolution, which will have a lasting effect on virtually every household. Some policy makers and industry leaders point to the success of South Korea's national technology initiative as evidence that the U.S. government can break the broadband logjam without excessive regulation.

From scores of interviews with government officials, technology executives, industry analysts, academics and consumers, CNET News.com has drawn several recommendations that could help form a national broadband agenda, based on three key points: incentives to spur competition, authority for municipalities to build their own high-speed networks, and changes to communications laws that predate the modern Internet.



Both presidential candidates want universal broadband access, but they have outlined different ways of getting there.

Sen. Kerry

- Introduce 20 percent tax incentive for "next generation" broadband investment
- Put in place universal broadband for emergency services by 2006
- Free up more wireless spectrum for broadband
- Promote rural broadband purchasing groups to help lower prices

President Bush

- Keep Internet access tax-free
- Eliminate regulations that discourage investment
- Use federal land for wireless towers, fiber rights of way
- Free up more wireless spectrum for broadband

In the largely rural community of Chico, a Northern California town in an agricultural area about an hour north of Sacramento, Jim Higgins' DigitalPath Networks is going head-to-head with cable leader Comcast and telecommunications giant SBC Communications. The small company sells broadband connections based on popular Wi-Fi technologies--similar to those in many homes, hotels and wireless cafe "hot spots"--that relay signals among fixed receivers to serve a wider territory.

Although DigitalPath's service is limited, it represents the viability of the kind of alternative-communications technology that buoys the free-market optimists of Washington. More competition generally means lower prices, and in other parts of the world that has led to faster networks and better customer service.

When you look at the trends, it's not chaos yet--but, if everything continues, it will be chaos in a couple years.

--Blair Levin
analyst, Legg Mason

Under today's policies, U.S. telephone and cable companies are allowed near-complete control of their networks--a situation that consumer groups say stifles competition from businesses and technologies that are not part of the DSL-cable duopoly that dominates much of the country's markets. The slower dial-up Net access business, by contrast, was built up by hundreds of companies, often with dozens of small providers competing in a single area. They served a wide variety of customer demands by offering Internet connections with different pricing and service plans, using telephone lines that carriers are mandated by law to share.

"The FCC is pursuing the 'cable model' of closed networks, in which facility owners act as gatekeepers. This will produce neither genuine consumer choice nor an environment that promotes dynamic innovation," the Consumers Union and the Consumer Federation of America contended in a joint letter to Bush in March. "That is not consumer choice; it is a dictatorship by the facility owner. This has led to inflated and rising prices."

If policy makers are serious about stimulating the economic and societal changes inherent with broadband, they must take substantial steps to help create a truly competitive market. Possible incentives--which would not need to be direct subsidies--include affordable loans, tax credits or other financial assistance to companies building their own networks, so they can offer services that

compete with the cable and telephone juggernauts.

Existing legal structures force regulators to make absolute category distinctions that don't work for Internet-based applications.

--Kevin Werbach
former FCC lawyer

Some steps toward this goal have already been taken, including a $2 billion low-interest loan program for rural broadband access programs, passed as part of the Farm Security and Rural Investment Act of 2002. For the most part, however, two fundamental goals remain unmet: bringing broadband to outlying areas that might otherwise be left behind, and stimulating investment in next-generation technologies that are much faster than the status quo.

In crafting these incentives, though, policy makers must guard against pork-barrel politics and prejudice toward specific technologies. Decisions made by politicians and bureaucrats unfamiliar with technology are among the many reasons that the industry has long opposed government regulation.

"I think that those kinds of incentives are helpful, but removing the regulatory barriers to investment are actually more important to stimulating investment," said David Young, director of technology policy at Verizon Communications, a regional phone company.

The federal government has ample precedent for acting as a catalyst in the construction of national infrastructure.

In the 1860s, proponents of transcontinental railroad projects found it difficult to raise cash from banks skeptical of their future. To help build what was seen as a critical national infrastructure, Congress gave four of the five transcontinental projects land grants amounting to millions of acres, some for laying tracks and some to sell in order to defray construction costs.

Highways, which benefit all who drive cars or consume foods transported in refrigerated trucks, were built with taxpayer money. Rural telephone networks were subsidized by government programs, which still lead to slightly higher telephone bills in urban areas--essentially a tax collected by the phone company.

Entrepreneurs like DigitalPath's Higgins do not believe in outright subsidies for money-losing ventures. As tempting as such help might be for struggling businesses, that kind of artificial support is anathema to the libertarian principles held by many in the high-tech industry.

Instead, he believes that the government can provide the seeds to encourage critical private-sector investment.

"Low-interest debt, if it is material, would help," Higgins said. "That would stimulate the investors to want to invest. Get the money flowing out of the venture capitalists. That's what is going to drive the alternatives."

Connecting one town at a time

Kutztown is a typical industrial town of 5,500 about halfway between Allentown and Reading in Pennsylvania, with a band shell in its park, a roller rink on Main Street and a tradition of self-reliance. In the late 1990s, civic leaders got so frustrated with the reluctance of cable and phone companies to bring broadband there that they decided to do it themselves.

The community built its own fiber-optic line, over the objections of Verizon and Cablevision, and last year began offering voice, video and data service directly to local residents. They paid for the $7.5 million project largely with 30-year municipal bonds, giving it much more time to

BROADBAND PLAYERS

Telephone companies, cable networks, courts, consumers and regulators are still sparring over the future of high-speed Internet services.

Verizon

Took an early lead in fiber-to-the-home setups when it announced its project in early 2004. CEO Ivan Seidenberg has said the company will offer fiber to 1 million homes by the end of this year. Right now it provides mostly DSL service, sold to more than 2.7 million customers.

SBC

Announced a nearly $6 billion project last month to bring fiber connections to consumers. The company's DSL business has boomed since it signed a deal with Yahoo, reaching nearly 4 million people in the first quarter of 2004.

Comcast

After inheriting AT&T's network, Comcast became the largest U.S. broadband provider, making more than $698 million offering Internet service in the first quarter while reaching 5.7 million subscribers. It has boosted download speeds and claims its network can ultimately rival fiber in speed after some modifications.

Time Warner

Its cable service is booming, with 3.4 million subscribers. But the company's

become profitable than commercial operations usually have.

Hundreds of other municipalities, mostly in rural areas avoided or underserved by the communications giants, have started or are planning similar broadband projects. The cable and telecommunications companies are so threatened by these grass-roots networks that they have redoubled their lobbying efforts against them in recent months.

Specifically, the large companies have seized on a March decision by the U.S. Supreme Court, which ruled that states have the legal right to block local governments from building their own telecommunications utility projects. Although only about a dozen states have laws that block or limit local government broadband projects, cable and phone companies are citing the ruling in efforts against local networks in the Pennsylvania capital of Harrisburg and in other jurisdictions.

"It is being used in a political sense to cause concern among city council members and utility members," said Richard Geltman, general counsel for the American Public Power Association, a municipal utility trade group that also monitors public broadband projects. "It has been used by incumbent providers with state legislators to seek state legislation for municipal prohibitions, saying that the Supreme Court has endorsed that position, which it did not."

making the transition from dial-up to the broadband world and continues to shed subscribers.

FCC

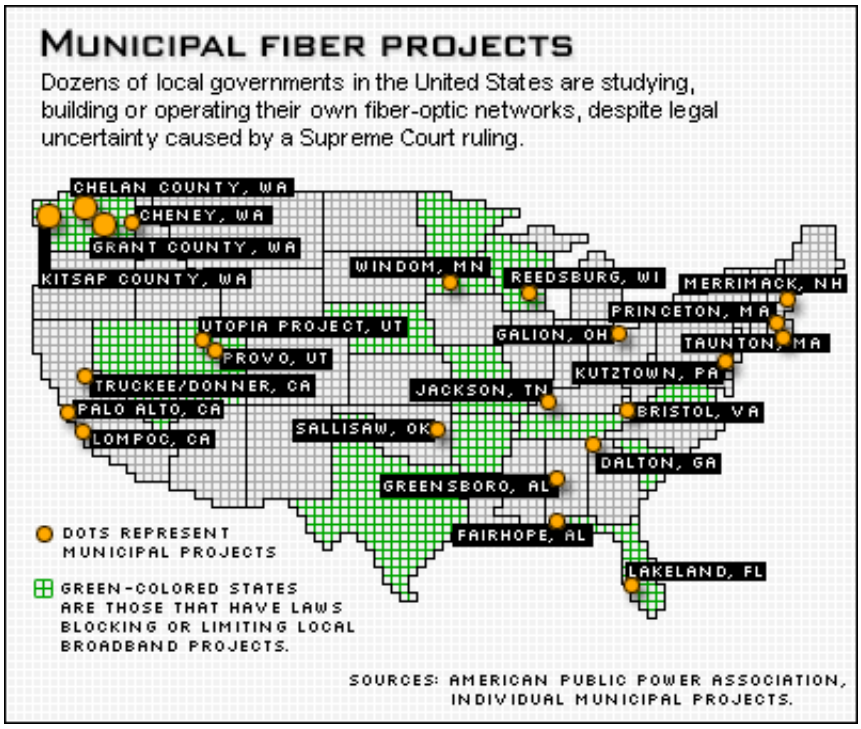
Under Chairman Michael Powell, regulators have pushed to lift requirements that force telephone companies to allow other ISPs to offer broadband service over their lines. Competition between technologies such as DSL, cable and wireless is enough to protect consumers, Powell has said.

Consumer groups

The Consumers Union and the Consumer Federation of America have pushed for "open access" on broadband networks, which means letting outside ISPs offer service on cable and telephone lines. Without competition, prices will be higher , they have said.

Federal courts

Have overturned many of the FCC's rules on broadband and telephone service. One recent decision could compel cable companies to share their networks with outside ISPs.



Geltman and others believe that Congress should step in to protect local broadband projects even if state legislators--who often prove receptive to the big-money lobbying campaigns of large corporations--are opposed.

The idea of such overriding federal action has found support even among some who are typically wary of allowing government at any level to take over functions normally performed by private companies.

"If there are state laws that prohibit municipal projects, we should probably look at that again," said Rick White, a former Republican congressman who is now chief executive of TechNet, a lobbying group that represents the technology industry.

Frank Caruso, Kutztown's director of information technology, says he doesn't lose sleep worrying about opposition to local projects like his, because those projects simply make too much sense.

"Elected officials are going to have a tough time telling voters that they don't have a right to save money in their own communities," he said.

Bringing laws up to hyperspeed

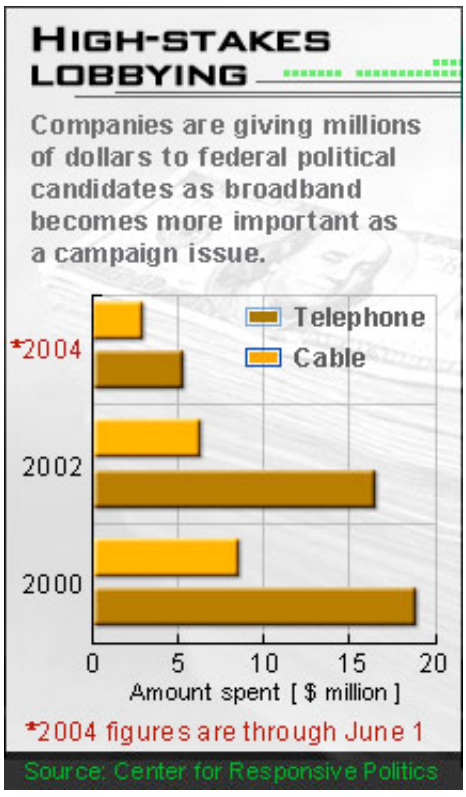
Four years ago, communications analyst Kevin Werbach, a former FCC lawyer, penned a manifesto advocating a new kind of regulation for the Information Age, writing that "communications will be a subset of Internet policy, rather than the reverse." That statement, considered hyperbolic at the time, has proved prescient.

The FCC has tried its best to apply pre-Internet laws to today's landscape, but those measures are proving a poor fit. Regulations aimed at fostering competition have been repeatedly blocked by courts. A generation of upstart telecommunications companies has collapsed. Meanwhile, giant cable and phone companies now offer almost indistinguishable service packages, despite still being regulated in very different ways.

"I don't think anyone would disagree that there has been a tremendous amount of confusion and bitter opposition in trying to implement the 1996 Telecommunications Act," Werbach said in a recent interview. "The clear problem we have today is that the existing legal structures force regulators and other policy makers to make absolute category distinctions that don't work when you're talking about Internet-based applications."

One solution, according to Werbach and a rising number of academics, is a "layered" regulatory system based on the Internet's architecture, rather than on a 70-year history of networks and technologies that are now obsolete. Elements of the concept are contained in legislation proposed by MCI.

A layered system would treat corresponding elements of different networks similarly. It would recognize that cable TV and telephone wires are increasingly carrying the same bits of data and apply the same appropriate rules to them, instead of regarding them as entirely different creatures.



This would, for instance, make voice services subject to the same laws whether they are provided over a cable network, a telephone line or an Internet Protocol connection. Advocates note that this approach requires only consistency, not more regulation.

Phone and cable companies remain skeptical, fearing that the practical result would be to leave their networks subject to more government intrusion. Instead, they say, the FCC should selectively remove government controls until all industries face as little regulation as possible.

"There is already a version of the layered approach in place," said Dave Pacholczyk, a spokesman for telephone carrier SBC Communications. "They can forbear from applying certain rules to certain industries."

Others say they are concerned that the congressional action necessary to modernize broadband regulations could lead to an expensive political battle that likely would once again favor deep-pocketed industries that can afford extensive lobbying.

"It's an interesting approach, and is a good intellectual point for discussion," said Jeff Campbell, director of technology and communication policy for networking gear maker Cisco Systems. "But at this point in time, it is not very realistic."

Nonetheless, it is clear that the telecommunications rules made for yesterday's networks are increasingly inappropriate and therefore ineffective in governing the 21st-century infrastructure--meaning major changes are inevitable.

"The whole concept of the Communications Act is breaking down in so many ways," said Rick Whitt, senior director of global policy and planning at MCI. "A lot of folks are looking for a way out." ■

South Korea leads the way

By John Borland and Michael Kanellos
Staff Writers, CNET News.com
July 28, 2004, 4:00AM PT

SEOUL, South Korea--Matt Renck is spoiled.

Ever since moving here to teach English two years ago, Renck has had a high-speed Internet connection of 8 megabits per second--only about average for a South Korean apartment,but nearly eight times the typical broadband speed in U.S. households. He watches TV shows over this connection, creates multimedia projects for his class, and regularly updates a Weblog.

CASE STUDY: PC BAANG

Kids typically spend a couple of hours a day playing games at this PC baang in Seoul. *Photo by Sue Shim*

Playing by numbers

- In 2002, PC baangs accounted for $1.2 billion in revenue--43 percent of the country's overall revenue from gaming.
- 40 percent of visitors were in their twenties, while 38 percent were teenagers.
- The world's most popular online game is "Lineage," a Korean role-playing game.
- Online games have about three times the market share of either PC or platform games in South Korea.
- The Korean games market is expected to reach $4.3 billion in 2005.

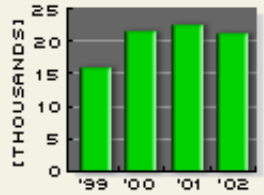
Game power

Internet gaming has been a key component in driving demand for broadband in South Korea over the past half decade. The country has TV stations dedicated to gaming. A book series teaches English through the game "StarCraft." And the country's president has served as honorary chairman of the World Cyber Games organization.

At the heart of this boom has been the "PC baang" ("baang" is roughly a synonym for "room"). Students flock to these Internet cafes to play, socialize and even date. As home broadband has spread, online gaming has shifted more into bedrooms, but the PC baang remains a fixture on city streets.

Big baang

Number of Internet cafes in South Korea



Source: Korean Game Development Institute

None of what he does is revolutionary; it just happens far faster than it would in America. And that's a little revolutionary all by itself.

"I didn't realize how much the Web had to offer until I got to Korea," said Renck, a programmer by training. "I couldn't appreciate it until I got here and saw what true high-speed access does to change your perception of how fast information truly moves."

For Americans, almost none of whom have access to speeds that Renck and many South Koreans take for granted, this difference is jarring. The United States considers itself the center of technological innovation, yet South Korea has gone considerably further in making a mainstream reality out of the futuristic promises of bygone dot-com days.

Many U.S. executives and policy makers are quick to dismiss the disparity, noting correctly that South Korea's densely populated areas have made it easier for telecommunications companies to offer extremely fast service to large numbers of people. But even with such geographic and demographic differences, the United States can learn some valuable lessons from South Korea's experience in jump-starting a broadband powerhouse.

"I think there are a quite a few lessons," said Taylor Reynolds, an International Telecommunications Union analyst who recently completed a survey of Internet and mobile services in South Korea. "Most of the growth is tied to effective competition, which you don't see in a lot of places in the United States."

The Seoul government's clearly articulated vision for modernizing the country's infrastructure stands in stark contrast to the regulatory

morass that has stunted development in U.S. telecommunications for several decades. South Korea's policy--the cornerstone of a national technology initiative to help revive a devastated economy--has created true broadband competition, which in turn has helped prices fall and speeds rise.

Although its economy is still struggling, South Korea has made significant progress with many forms of digital technology. Citizens can get "video on demand" online, often even with high-definition video, for less than Americans pay to rent a DVD. Low-income students use high-speed Net connections to take free tutorials for the national aptitude test, an SAT-like exam that can determine college admissions and future job paths.

Online gaming is a massive cultural phenomenon, with three TV channels dedicated to the subject and good players attaining the fame of American sports stars. In addition, South Koreans spent more than $1.6 billion shopping online in the first quarter of 2004, or about twice as much per capita as U.S. residents .

"The vision of a broadband society is already here in Korea," said Eric Kim, executive vice president of global marketing operations at Samsung Electronics. "We are two to three years ahead in wireless broadband, and people are using it, too."

Had it not been for the government leadership, they would not be where they are today.

--David Young
director of technology policy, Verizon

The country's achievements are even more impressive considering its starting point in technology. In 1995, fewer than 1 percent of South Korean residents used the Internet, though a larger number subscribed to proprietary Korean-language networks that were somewhat like the closed CompuServe and America Online networks of the late 1980s. By 2004, more than 71 percent of South Korean households subscribed to broadband Net services, according to local estimates.

The decision to focus on broadband began in the mid-1990s and intensified after South Korea's economy was crippled by the collapse of the Asian financial markets in 1997, when policy makers targeted technology as a key sector for restoring the country's economic health.

Korean regulators set out a clear path for the network industry with well-publicized national goals. All big office and apartment buildings would be given a fiber connection by 1997. By 2000, 30 percent of households would have broadband access through DSL or cable lines. By 2005, more than 80 percent of households would have access to fast connections of 20mbps or more--about the rate needed for high-definition television.

The government also spent $24 billion building a national high-speed backbone network linking government facilities and public institutions.

Even skeptics in the United States say that the South Korean government's advocacy role and intense focus can serve as a model for other countries looking to modernize their infrastructure.

"Had it not been for the government leadership, they would not be where they are today," said David Young, the director of technology policy for Verizon Communications. "There is a lesson to be taken there in setting a goal and providing support to achieve it."

A cursory look at the financial numbers shows why. During construction of the network, about 13.5 percent of South Korea's gross national product came from businesses selling equipment and services, Sang-kyoo Choi, the director of the IT Industry Cooperation Division, International Cooperation Bureau of the Ministry of Information and Communication (MIC), said in an interview.

Between 1995 and 2003, the market for IT servers increased by more than four times, and the network equipment market also quadrupled in size, according to the MIC. Start-ups such as PolyPix, a maker of Internet telephony software, have appeared. Japanese venture investor Softbank has a stake in PolyPix, which is one of the software providers for Yahoo's Japanese broadband services.

Cumulative revenue from online content has similarly exploded. Companies that provide online games and services like the Cyworld blogging site have penetrated all segments of society and become a national obsession. Corporate executives chronicle their daily lives through blogs.

The daily pervasiveness of broadband in South Korea is one of the primary reasons that Intel created a new lab dedicated to the digital home in Seoul. The company is studying how Koreans use the Internet, from shopping to gaming, to understand how the technology can be developed for other countries.

"The usage model is critical," said M.C. Kim, general manager for Intel Korea. "Online gaming is one of the killer apps."

In many ways, the most important question answered in the country's grand broadband experiment has been one of demand. Broadband progress has long been delayed in the United States and other countries as a result of uncertainty about how much interest consumers would have in paying for the expensive infrastructure needed for high-bandwidth services.

As a result, entire industries have been paralyzed for years by a classic Catch-22, as content companies and network carriers waited for one another to make the first move before investing in broadband products. Telecommunications start-ups tried to break that stalemate in the 1990s by investing large sums to offer rival high-speed connections to customers, only to be gutted in the dot-com bust.

What South Korea showed is that, if you build it, they will definitely come.

"The crazy fans are really crazy," said Guilliame Patry, a Canadian national who moved to Seoul in 1999 after he became the world champion in "StarCraft," a real-time strategy game. He's now a well-known figure in South Korea, where as many as 30,000 people typically attend game tournaments.

Such cultural phenomena can be traced directly to the government's emphasis on the importance of broadband for the advancement of society in South Korea, as well as for its economic health. Part of that campaign involved Internet training for the portion of the population deemed likely to be left behind in the digital age.

About 10 million people fell into this category in the first round of the government's initiative, including stay-at-home wives, military personnel, disabled citizens, and even prison inmates. That program was ultimately expanded to practically anyone who wanted it.

BUILDING BLOCKS

One obstacle to reproducing South Korea's broadband explosion in the United States is purely physical.

The density of housing in Seoul allows companies to provide very fast broadband connections to a majority of people.
Photo by Michael Kanellos

The city of Seoul is home to 10 million people--almost one quarter of the country's entire population. Many urban Koreans live in high-rise apartment blocks, unlike city-dwelling Americans, who often occupy smaller buildings and houses.

"It is pretty different in a lot of ways," said David Young, director of technology policy at Verizon Communications. "Their demographics and housing density certainly made it easier to achieve the rapid penetration and high speeds that are available there. That cannot be easily emulated."

In Korea, large apartment buildings make it relatively simple for a telecommunications company to draw a fiber line to the basement and then provide VDSL (very high speed digital subscriber line). VDSL can offer as much as 50 to 100 megabits of service over short copper lines, so it is well-suited to these buildings.

But the technology doesn't work so well in the United States, where the distance between homes and the telephone company's central offices are often large. As a result, the big phone companies say they are avoiding VDSL for the most part and looking instead to install fiber optics as a next-generation technology.

"We've continued to work with the standards organizations," SBC Labs Executive Director Eugene Edmon said. "But we've got a good focus on the fiber. That helps us expand and helps keep the vendor community-focused."

Consumers began switching over quickly from their dial-up Internet access after 1999, prodded in part by better rates. Dial-up accounts were often charged by the minute, while broadband services were offered for a flat monthly rate.

Yet consumer demand was only one element in the broadband equation; the networks still needed to be built, and their services had to be affordable for most citizens. For this to occur, South Korea's government worked closely with providers, encouraging investment and coming up with a development strategy that was collective but still included a deep reliance on competition.

"The government made a decision to be very focused on this issue and set some very aggressive goals," said Laura Ipsen, Cisco's vice president of worldwide government affairs. "They worked with service providers to decide what the infrastructure would look like. Part of the plan included how the government and the private sector could help improve take-up rates."

Most of the country's consumers were already served by the dominant carrier Korea Telecom, but the government encouraged competitors with a low-interest loan program for companies that built their

own broadband facilities. The program offered $77 million in two years alone, with a particular focus on rural areas.

They can't keep selling on speed...the competition is so cutthroat that they are moving to great customer service.

--Taylor Reynolds
analyst, International Telecommunication Union

The government offered other incentives for Korea Telecom. Once a state-owned monopoly, the company began the transition to private hands in 1993. But the government, which retained some shares until 2002, allowed the process to become final only on the condition that Korea Telecom bring broadband--defined as connections of 1mbps--to all the villages in the country.

As was the case with established U.S. telephone companies, Korea Telecom was initially reluctant to cannibalize its profitable dial-up ISDN business. The company eventually plunged headlong into high-speed service over DSL and fiber-optic lines, but only after rivals got an early jump on the broadband market, beginning to offer widespread services in 1999.

One of these was a well-financed newcomer called Hanaro Telecom, which is now the second-largest provider of service in the country. In some cases, Hanaro offers services over Korea Telecom's telephone or cable lines. But it also has built many of its own fiber lines, so that many apartment buildings have two separate fiber strands in their basement, giving consumers a choice between services.

The competition has driven down prices and boosted access speeds quickly. Having reached the limit on those approaches, they're now competing on customer service. Hanaro recently offered a PC help service that diagnoses computer glitches remotely over a broadband connection, and it promises to send a technician out to help if the problem can't be fixed that way.

"Once they hit about 20mpbs, they're not in as big a rush to put out faster and faster speeds," ITU's Reynolds said. "Now they're working on more services that come along with the access. They can't keep selling on speed, but the competition is so cut-throat that they are moving to great customer service."

So successful has South Korea's experiment been that it is even exporting its expertise. Several companies are marketing consulting services and equipment to Russia and Southeast Asia.

Whether that advice will make its way to the United States remains an open question. Both President Bush and likely Democratic challenger John Kerry have called for ubiquitous broadband access, but neither has expressed goals anywhere near as ambitious as South Korea's.

The vision of a broadband society is already here in Korea.

--Eric Kim
executive VP, Samsung Electronics

Nevertheless, natural market forces seem to be pushing the U.S. industry in a similar direction. Competition between cable modems and DSL, even as muted as it is in many places, has helped drive down DSL prices and boost speeds offered by cable companies. A first generation of rivals that used the DSL lines have largely vanished, but new competition could be offered in a few years by wireless, power line and satellite broadband companies.

"The presence of those competing technologies will drive things forward," said Floyd Kvamme, the Silicon Valley venture capitalist who co-chairs the President's Council of Advisors on Science and Technology. "If (broadband) is worthwhile, competition will drive it into anyone's home who really wants it." ■

CNET News.com's Michael Kanellos reported from Seoul and John Borland from San Francisco.

Cable, DSL face threats

By Jim Hu
Staff Writer, CNET News.com
July 29, 2004, 4:00AM PT

ROSEVILLE, Calif.--For 88 years, the Roseville Telephone Company watched the telecommunications world transform the 83 square miles it served surrounding this former railroad town outside Sacramento.

CASE STUDY: SATELLITE SIGNALS THE WAY

An Ariane 5G+ rocket launched in July carried a satellite payload for broadband provider WildBlue.

Rural Action Plan

The FCC hopes to bring advanced broadband to underserved areas. Measures include:

- Wireless spectrum licensing: Flexible licensing of spectrum to small service providers in rural markets.
- Wireless Internet service providers: Freeing up more unlicensed spectrum and introducing technologies for small companies to market.
- Satellite: Spurring satellite firms to offer more services to rural U.S.
- Outreach: Spark more interest in installing rural broadband access

Source: Speech by FCC Chairman Michael Powell, February 2004

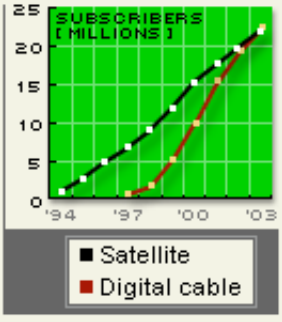
Building a beachhead

Alternative broadband providers trying to break in to duopoly markets should look to the rise of satellite TV. In the 1990s, satellite companies got established in rural areas where cable had not reached, before expanding into urban markets.

This strategy worked. After a few years, satellite technology improved, gear got cheaper, and the industry upgraded to digital networks, with hundreds of channels. This forced the cable TV industry to spend around $80 billion playing digital catch-up.

TV space race

The swift growth of digital satellite TV service in the United States took rivals by surprise, but cable companies caught up quickly.



Source: In-Stat/MDR

Then in 2002, the small company decided to join the fray and bought the assets of a fiber-optic network in bankruptcy--a move that catapulted it into the hyperspeed of the digital age. Roseville Telephone changed its name to SureWest Communications and began offering video, phone and high-speed Internet services, taking on industry giants SBC Communications and Comcast.

"We're competing with companies that are exponentially bigger than us," said Bill DeMuth, the chief technology officer at SureWest. "The competitive advantage we have over SBC and Comcast is the fiber."

SureWest is one of a handful of broadband companies that are trying to leapfrog local incumbents, using as leverage new technologies that promise a different breed of Internet access. These challengers hope to disrupt what has long been a two-horse race between cable and DSL (digital subscriber line) in most U.S. cities, yielding faster service at lower prices and encouraging the development of new businesses along the way.

The alternative broadband companies, which range from family businesses to multinational conglomerates such as AT&T, are attacking the market on many fronts. Some are building networks in rural areas that have been largely neglected, while smaller outfits are concentrating on personal customer service. Others are working to bypass the industry leaders that own the broadband pipes using next-generation technologies such as satellites, wireless networks and electrical lines.

As tempting as the potential may be, these strategies face monumental obstacles. For one, they're competing against well-established telecommunications and cable players with widespread brand recognition and seemingly endless resources. The communications

landscape is littered with defunct start-ups that raised billions of investment dollars during the technology boom of the late 1990s, only to crash along with the stock market a few years later.

Yet some of their ideas have found new life as the economy has recovered, especially at companies like SureWest that have picked up expensive technologies at fire-sale prices. Even in areas dominated today by cable-DSL duopolies, the prospects for growth are as vast as the Wild West--and that has rekindled the gold-rush spirit among some broadband entrepreneurs.

"There's probably more money for these things now," said Jim Penhune, an analyst at Strategy Analytics. "The flipside is that broadband is farther along than it was in 1999, and they're going up against some strong incumbent providers, who are gaining momentum themselves."

To date, most consumers have basically had two broadband choices: high-speed Net access from cable operators or DSL service from Baby Bell phone companies. By the end of 2003, either cable modem or DSL connections were used in almost all of the 22 million U.S. households with broadband access, according to research firm The Yankee Group.

Cable and phone companies build, maintain and upgrade elaborate broadband networks in most cities. Although each municipality has different regulations, most have provisions that allow one cable and one landline phone company to offer service to their residents.

The battle between cable and DSL has intensified over the past year. The Bells have introduced price cuts and have largely kept pace with cable in adding new customers. Cable companies, for their part, have boosted their download speeds to about 3 megabits per second in hopes of counteracting the lure of cheap DSL offers.

That has left little room for other technologies to break into metropolitan markets, let alone establish a foothold. As a result, many alternative broadband companies are concentrating on rural and less-populated markets--following a path set by satellite TV operators more than a decade ago.

The Internet will disappear and become everywhere. It will be a part of our lives, part of us, part of the fabric of most of the things we do.

--Geoff Ralston
chief product officer, Yahoo

In the mid-1990s, satellite TV companies launched services that targeted people in rural areas that were not served by cable. Once they were established in these regions, companies such as DirecTV and EchoStar's Dish Network took the competition an important step further by offering hundreds of television channels via digital broadcast.

"That's what made cable go out and do its $80 billion upgrade," said Rob Sanderson, an analyst at American Technology Research, who sees similar market forces at play in today's broadband business. "They want to hit the guy who's dying for broadband out in the sticks."

Broadband is in the air

Given satellite companies' initial success against cable in television, it's fitting that the industry is in the forefront of challenging the land-based incumbents in broadband.

Although their connections are more expensive and slower than DSL or cable, satellite companies are trying to regain ground through services such as DirecTV's Spaceway broadband Internet access for small businesses. The company is using a new satellite technology called Ka-band that allows two-way transfer of information.

Many in the high-tech and venture capital communities are focused on new types of wireless connections, however.

"Right now, cable and DSL are the primary means for broadband," said Emmy Johnson, an analyst at Skylight Research. "But wireless broadband has the potential to be the third leg of this broadband stool."

That's the case in Chico. With its population of 68,000, the Northern California community illustrates how smaller cities don't get picked up by the radar of the big broadband providers when they lay their expansion plans. It's just a year since SBC started offering DSL there, and just under 6 months since Comcast introduced cable broadband.

About 15 months ago, Chico resident Marty Griffin decided enough was enough. Fed up with SBC and Comcast's heel-dragging, Griffin agreed to allow Digitalpath Networks, a local broadband

provider that runs a proprietary wireless network, to mount a three-foot antenna on his roof and to turn his house into a relay station. Griffin has been happy with his service and, most importantly, he got broadband before the local duopoly got its act together.

"Back then, Comcast wasn't available in my neighborhood," said Griffin, a programmer for a local rock station. "I wanted to jump on this first, and I didn't want to lock into anything long term."

Wireless services have tremendous potential, but their history is one of mixed success at best. In the late 1990's telecommunications giants Sprint and MCI tried launching national "fixed wireless" broadband services as a way to circumvent cable and DSL.

In a fixed wireless set-up, fiber-optic cables are run to a broadcast tower and a broadband connection is beamed to a receiver mounted on the customer's rooftop. The problem with that early generation of services was that anything blocking the signal's trajectory--like a tree, or a neighbor's house--cut off Internet access, causing a number of headaches.

Sprint overpromised and underdelivered its fixed wireless technology, signing up more people than its network could handle, which led to consistent service slowdowns. The company ultimately stopped offering the service, deciding instead to wait for the newer generations of the technology that were on the horizon.

Those next-generation forms of wireless broadband are now beginning to emerge, promising to cover greater areas with stronger, more stable connections. Some of these options will come from cellular telephone companies, which are spending billions of dollars on upgrading their networks to offer high-speed data services. But among the most promising technologies is WiMax, a new wireless broadband standard that was approved last month.

WiMax networks will be built using special towers in residential areas to send and receive Internet data. That data is picked up by devices mounted on houses and is sent inside to boxes, which in turn transfer the data to PCs.

But the concept has seen strong interest recently among Internet access companies such as EarthLink and Covad Communications, which are considering WiMax as a way to offer broadband services without being beholden to cable providers or Bells for use of their cable or DSL networks.

"I think that wireless will become a dominant part of our business. There's no doubt about it," said Pat Bennett, an executive vice president of product development at Covad.

Covad has relied on traditional copper lines leased from the Bells for its DSL service, using access that has been mandated for years under antitrust policies. But the Federal Communications Commission is phasing in regulations that will not require the Bells to share new lines with outside companies.

Fearing that the Bells will charge exorbitant rates or refuse to share lines altogether, Covad and other companies that resell Internet access are looking for alternative technologies for their wholesale broadband. EarthLink has already made initial forays into the wireless market, recently launching a

A WESTERN PIONEER

For 83 years, Roseville Telephone sold phone service to residences and businesses throughout three California counties.

But when the Telecommunications Act of 1996 was passed, the company was forced to diversify in order to fend off competition from big carriers and from smaller upstarts. It began selling cell phone and broadband service and, after renaming itself SureWest Communications in 2001, started looking for ways to break out.

Then a company called Winfirst went bankrupt after spending $250 million on a fiber-to-the-home network in the Sacramento area. In 2002, SureWest acquired those assets for $12 million. Now it offers two-way broadband at 10mbps--a speed premium that helps it take on SBC Communications and Comcast.

Looking back:

1891 Roseville's first telephone installed in the store of W.J. Branstetter on Pacific St.

1914 Roseville Telephone founded, with 160 subscribers in the town and surrounding area.

1920 700 telephones in service.

1953 Converts to dial service.

1974 Installs first electronic switching equipment.

1980 Unveils a digital switching system.

1986 Installs fiber-to-the-home service in a Roseville subdivision.

1997 Telecommunications Act of 1996 adopted.

1999 Adds wireless and broadband Internet.

2001 Becomes SureWest Communications.

2002 Buys WinFirst assets. Launches digital TV, broadband Internet and telephony over FTTH network in Sacramento area.

2003 Reaches 10,000 customers for FTTH service.

Source: SureWest Communications

service with Digitalpath in Northern California.

To the WiMax

WiMax networks are not expected to appear widely until the end of 2004 or the beginning of 2005, but tech giants such as Intel are already betting heavily on the technology. Intel plans to release chips for WiMax gear such as towers and relay stations within the next five months. It intends to include WiMax capabilities in its notebook PC processors by 2006, a move that would let companies provide Internet access directly from towers and eliminate the routers and other boxes now needed for wireless networks in the home.

Still, WiMax must clear some high hurdles, such as conflicting technical standards, before becoming a serious threat to cable and DSL. And even if WiMax or other new broadband technologies are able to establish themselves in rural areas, it is unclear whether they will be able to succeed in markets where DSL and cable are already deeply entrenched.

In the lucrative urban markets, households are plugging into cable modems and DSL services in droves. At the end of March, 28.6 million of the U.S. households with broadband subscribed to cable or DSL, out of a total 29.3 million.

"If they're already a DSL user, it takes a lot to get them to change," said Mike Paxton, an analyst at market research firm In-Stat/MDR. "Once you get someone locked into service like broadband, probably 70 to 80 percent of those people will be unlikely to change services."

Complicating matters further, cable and DSL are increasingly being bundled with hundreds of television channels, phone service and cellular discounts.

Wireless broadband has the potential to be the third leg of the broadband stool.

--Emmy Johnson
analyst, Skylight Research

Even if alternative broadband companies are able to address such business and technology questions, they must face what is perhaps the most daunting challenge of all: regulatory politics.

In its most significant broadband measure, the FCC last year granted the Bells exclusive rights to any "advanced" fiber networks that they plan to build. That decision, outlined in the FCC's Triennial Review, was viewed as favoring the Bells, because they would not be required to lease such new fiber lines to outside companies that--like Covad--might want to offer rival Net services. The phone companies had been required to share traditional copper wires and fought to change that rule for many years.

At the same time, wireless and other alternative technologies have been quietly gaining support within the agency. In February 2003, the FCC drafted rules on broadband service over electricity lines that were interpreted as an overture to alternative companies, particularly in areas not served by cable or the Bells. And in May, FCC Chairman Michael Powell said the agency is looking to free up broadcast television spectrum for broadband wireless use. The agency has taken steps to encourage these and other alternatives to today's coaxial-cable and copper-wire lines, including fiber-optic connections to the home.

Some of these technologies might be subject to regulation to deal with concerns such as competition for spectrum with amateur radio operators and possible interference in public safety communication. But the FCC's decision to weigh in has been considered a positive step.

"The more options that are available, and the more capabilities provided, the better off we are," Ed Thomas, chief of the Office of Engineering and Technology at the FCC, said in an interview.

In this panoply of future technologies, broadband optimists are hoping to make high-speed Net access as common as a cell phone connection, following people into their homes, onto the sidewalks, into automobiles and even inside airplanes. Only then will their vision of a genuine broadband society be achieved.

"What I think will happen with the Internet is it will disappear and become everywhere," said Geoff Ralston, chief product officer for Yahoo. "It will no longer be a 'thing.' It will be a part of our lives, part of us, part of the fabric of most of the things we do." ■

Bandwidth roundtable

July 26, 2004, 4:00AM PT

Why is the United States, No. 10 in a ranking of countries by the Organization for Economic Cooperation and Development, a broadband laggard?

With the political parties making broadband access an issue in the fall presidential election, CNET News.com asked leading figures from the worlds of business, labor and technology for their insights.

Vint Cerf
Senior vice president, MCI

Time to revisit our telecommunications policy

While the FCC's definition of broadband has been a relatively anemic hundreds of kilobits per second, technologies are available--or at least demonstrable--that can deliver hundreds of megabits per second. But there are still hurdles to overcome before such capacity can be widely deployed.

In the wireless domain, so-called WiMax technology, also known as IEEE 802.16, is of considerable interest. But issues such as power levels and frequency reuse still present challenges. Rural deployment adds its own cost issues. Urban deployment tosses multipath interference and, maybe, just plain old conventional interference into the mix.

On the policy side, the promises of the Telecommunications Act of 1996 have been dealt a mortal blow by the recent Supreme Court decision not to review lower-court decisions regarding regulations that would provide competitive carriers and Internet service providers (ISPs) with reasonably priced access to broadband facilities at local exchange carriers. History suggests that unregulated monopolies or market-dominant players have little incentive to innovate or to encourage competition.

If symmetric broadband is the objective, there appear to be only a few potential paths to follow. The most prominent among them are the local exchange carrier deployment of symmetric DSL and the roll-out of broadband wireless services such as WiMax. Ultrawideband, which remains a dark horse in this race, has yet to be proven in practice. Power-line signaling has had its moments of excitement but remains another uncertain candidate.

Open access to transmission services could be the key to a rapid evolution of new broadband services.

It is time to revisit our telecommunications policy. Open access to transmission services, allowing all ISPs to compete on a level playing field, could be the key to a rapid evolution of new broadband services. The Telecom Act of 1996 is an artifact of the 20th century. It's time to think 21st-century thoughts and use 21st-century technology for communication in this new millennium.

Vint Cerf is a senior vice president for technology strategy at MCI. Widely known as one of the "fathers of the Internet," Cerf is the co-designer of the TCP/IP protocols and the architecture of the Internet.

Reed Hundt
Adviser, McKinsey & Co.

An agenda for the broadband future

Since the beginning of 2001, the communications sector has been a disappointing segment of the national economy. Neither Congress nor the Federal Communications Commission has been able to change the downward trends or mood in the sector. It's high time for the following changes.

- **Open a wireless broadband pipe to the home**
  The FCC can make this happen by clearing spectrum currently used by UHF-TV stations and dedicating it to wireless broadband. This spectrum band has signal propagation characteristics that are ideally suited for wireless broadband, thus lowering costs by more than half and increasing the quality of signals by an even greater factor.
- **Encourage fiber to the home**
  A comprehensive broadband plan for America would copy the successes in Korea, Japan and elsewhere that were based on modest but effective government support to national communications companies, so as to create effective business cases for deploying fiber to homes. Wireless broadband is not the only solution to putting all of America on a ubiquitous broadband network--fiber ought to be part of the network as well.
- **Establish an intercarrier transfer plan**
  For more than a year, major carriers have negotiated a means of exchanging traffic. At critical moments when the FCC might have encouraged an agreement, it was unable to muster the initiative to take action.
- **Foster media diversity**
  In the last three years, the FCC was unable to translate any coherent antitrust policy into respectable, sustainable rules. It is past time to develop a blueprint for competition and diversity that is both reflective of today's markets and also respectful of the purpose of diversity rules.
- **Introduce spectrum reform**
  Since the mid-1990s, scholars and many FCC personnel have well understood the imperatives of spectrum reform. A great failing of the current FCC is its inability to translate the basic principles into rules. For example, spectrum should be freely transferable, unlimited in its use and widely available in both licensed and unlicensed formats.
- **Develop an international agenda**
  Given the imperatives of open markets and freely negotiated standards, the FCC should not have abandoned its international role in the last three years. In 2005, an active international agenda should be a core part of the FCC mission.

A comprehensive broadband plan for America would copy the successes in Korea, Japan and elsewhere.

- **Reconcile programming access**
  Currently, different distribution systems have different obligations and rights with respect to programming. Given the competition that stems from convergence, the FCC should reconcile the different regulatory regimes under a paradigm of neutrality.
- **Reform universal service**
  The FCC has made little or no progress since 2001 in solving the increasing problem of the disappearing revenue base for universal service. Moreover, the universal service programs at the state and federal level have grown less efficient over time. The goals should be restated and reaffirmed, and the program reformed comprehensively.
- **Outline public interest**
  Despite all the hullabaloo about Janet Jackson, the FCC has described no coherent blueprint for the public interest in the media. Next year, this should be a primary goal of the FCC and Congress.
- **Introduce management reform**
  The FCC has grown bigger, more awkwardly organized and more expensive over the last three years. In 2005, the agency should set forth a plan to streamline its functions so as to be smarter, faster, leaner and less of a burden on taxpayers.

Reed Hundt, who was chairman of the Federal Communications Commission from 1993 to 1997, has advised the John Kerry campaign on broadband issues. He is currently an adviser on information industries to McKinsey & Co.

Floyd Kvamme
Partner, Kleiner Perkins Caufield & Byers

Unraveling the regulatory bundle

Earlier this year, President Bush called for universal, affordable access to broadband technology by 2007 and said he wanted to make sure Americans have plenty of choices in purchasing broadband.

In the early years of telecommunications, the only form of access was via the telephone and its related wires. The technology of telecommunications has, of course, gone well beyond those telephone wires to include DSL over copper wire, satellite, cable (with its hybrid fiber coax and direct fiber to the premises) and the ever-expanding capability of wireless. There are also other carriers, such as power lines.

By and large, the private sector will deploy new technology. The federal role, as with most issues related to technology, is to create an environment in which innovation can flourish. The Bush administration has implemented a wide range of policy directives to create economic incentives, remove regulatory barriers and promote new technologies--all of which are essential to making broadband more competitively available and affordable.

Supporting deregulation of new broadband infrastructure, seeking to end the taxation of broadband access, removing bureaucratic delays in granting rights-of-way and enacting legislation to allow companies to depreciate capital expenditures more quickly are some of the federal government steps that have helped establish an environment where broadband can flourish.

There is still work to be done. For example, the Federal Communications Commission rules on the requirement for investors to share their installations with competitors must be fully resolved. The rollout of most of these broadband technologies involves a considerable commitment of capital. These commitments must be rewarded.

Unraveling the regulatory bundle is probably the largest remaining hurdle.

Another critical area is spectrum availability. Through the president's policies, the federal government has nearly doubled the amount of spectrum available for innovative wireless broadband applications such as Wi-Fi and WiMax. These technologies can provide a range of new services--from granting consumers broadband access in restaurants, airports and other public places, to providing an economically viable solution for providing broadband services in rural areas.

The technology exists today to meet the president's vision even before the 2007 goal. Unraveling the regulatory bundle is probably the largest remaining hurdle. Consumers and businesses are showing their willingness to buy into broadband. The latest FCC report on broadband penetration shows a fourfold increase in the number of broadband lines in the United States, from the beginning of 2001 to the end of 2003. Broadband is here. Soon it will be everywhere.

Floyd Kvamme was one of five people who founded National Semiconductor in 1967. Since 1984, he has been a partner at Kleiner Perkins Caufield & Byers. Kvamme served on the 2000 Bush for President campaign's high-tech advisory and national finance committees.

Mark Cooper
Director of research, Consumer Federation of America

How about some real competition?

A key to the success of the dial-up (or narrowband) Internet in the United States was a ubiquitous telephone network available to all information service providers on reasonable, nondiscriminatory terms.

The Federal Communications Commission followed this policy from the early 1970s, as computer applications over the telephone network began to spread, but abandoned it in the late 1990s, when cable modem service entered the market.

Cable operators, which serve about 85 percent of advanced-service broadband customers, closed their networks to competition. They exclude Internet service providers they don't own and restrict services offered over the advanced telecommunications network.

"Fast" 3-megabit services take up 3 percent of the capacity of cable systems and cost the customer $45 dollars per month. Yet cable operators offer digital TV in tiers priced at $15 per month, even though TV takes up much more of their capacity. Clearly, the companies' priority is to sell digital television.

In contrast to the dial-up Internet, which has an average of 15 ISPs per 100,000 subscribers, the cable modem high-speed Internet in any region is only available via one ISP, owned by the cable company. This is a disincentive for innovation in the broadband market, especially for video applications. Sadly, this could be the future for broadband connections over the same telephone lines that once fostered creative applications.

U.S. telephone companies charge three times as much per megabit as cable operators do.

U.S. telephone companies charge three times as much per megabit as cable operators do. They have dragged their feet on innovation, partly because they also want to be able to close their networks to competition. Although an appeals court declared the FCC policy of not enforcing open markets illegal, the telephone companies and FCC Chairman Michael Powell continue to devise schemes to block the policy of requiring open access for broadband companies to telephone and cable systems.

In Japan, the national telephone company took the lead in introducing high-speed facilities, with the requirement that it had to keep its system truly open. (Ironically, the Office of the U.S. Trade Representative demanded that provision as part of the general effort to open up Japanese markets). Japanese telephone companies charge about $25 per month for up to 8 megabits of service--about one-fifth of what Americans pay. Because telephone companies there are not allowed to discriminate against ISPs, video applications are booming, and broadband penetration is three times as high as that in the United States.

Applications stimulate deployment and adoption, but developers have been driven from this product space by the exclusionary and restrictive practices of facility owners. Stagnation will continue until we rediscover a simple principle--open communications networks are the key to dynamic innovation.

Mark Cooper is director of research for the Consumer Federation of America, a consumer advocacy group in Washington, D.C., that represents about 300 nonprofit organizations.

Scott Kriens
Chairman and CEO, Juniper Networks

Fix broadband's problems

Broadband is becoming increasingly important worldwide.

Whether it is used to enable Internet-based fundraising for the U.S. presidential campaign or to deliver advanced IP services such as video-on-demand or computer desktop conferencing, broadband is changing the way we do business.

When broadband first appeared in 1997, it was touted more as a speedy alternative to dial-up. However, as more people seek to download music, distribute digital photos, play games online and conduct private online transactions, it is apparent that the key concerns of broadband users are bandwidth, ease-of-use and security.

No longer satisfied with just e-mails and surfing the Web, people have become increasingly sophisticated in multi-tasking a plethora of bandwidth-intensive applications. This in turn has led to greater demand for network flexibility. Unfortunately, with its current infrastructure, carriers are finding it difficult to meet this demand in a cost-effective manner.

Another increasing broadband concern is security. With dial-up, people generally logged on for an hour or so--a brief window for hackers and viruses to contaminate a home PC or network. As broadband maintains an ongoing link to the Internet, users and networks are more vulnerable and susceptible to malicious attacks. This is a problem that will grow proportionally with the ever-growing

number of broadband users. For example, broadband users numbered a mere couple hundred thousand in 1997. By the end of the first quarter of 2004, global broadband subscribers had increased to more than 73 million.

This year, the presidential campaign is giving broadband much needed exposure, but it needs to be included on the national agenda. In addition to government policies such as subsidies for schools and other public agencies, the industry needs to examine ways to protect and improve our networks.

The key concerns of broadband users are bandwidth, ease-of-use and security.

Rather than providing only basic Internet access, broadband has the potential to change the way the world interacts and communicates. Advances in security and quality, connectivity in rural communities, and a rich array of new services will increase the value and utility of broadband.

Scott Kriens is chief executive officer of Juniper Networks, one of the major suppliers of infrastructure equipment for the Internet. ■